

INDIVIDUAL RESEARCH STUDY

**"A Critical Analysis of Air Operations Since
the World War."**

Submitted by:

**EARL H. DeFORD
Captain, Air Corps**

**The Command and General Staff School
Fort Leavenworth, Kansas**

1934-1935

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE 25 MAR 1935		2. REPORT TYPE		3. DATES COVERED 00-00-1935 to 00-00-1935	
4. TITLE AND SUBTITLE A Critical Analysis of Air Operations Since the World War				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Command and General Staff College, Combat Studies Institute, Fort Leavenworth, KS, 66027				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 17	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

Fort Leavenworth, Kansas
25 March, 1935

MEMORANDUM FOR: The Director of the Second Year Class, the Command
and General Staff School, Fort Leavenworth, Kansas.

SUBJECT: A Critical Analysis of Air Operations Since the
World War.

I. PAPERS ACCOMPANYING:

1. A bibliography.

II. The purpose is to arrive at logical conclusions as to the effect
of modern aviation on war of the future.

For the purpose of logical arrangement of this study, it is divided
into sections, as follows:

Section 1. Introduction

Section 2. Operations of England

Section 3. Operations of France

Section 4. Operations of Italy

Section 5. Operations of United States

Section 6. Conclusions.

Section 1

INTRODUCTION

In order that the nature of the operations carried on in the various theaters of operations, both on the ground and in the air, can be better visualized, a very brief, general description of the topography of the theaters is needed.

In fact, it seems to the writer that the nature of the terrain--and it is very similar in all theaters--as well as the type warfare (guerilla), dictated the extensive use of aviation.

The marked success of aviation can be attributed to the terrain, coupled of course, with the fact that in no instance was there an opposing air force.

Iraq

Bounded on the north by Kurdistan, on the south by the Persian Gulf, on the east by Persia and west by Syria, it comprises a territory of 177,160 square miles.

This land was formerly called Mesopotamia. The Desert Corridor extending to Transjordan forms a none too well defined border between Iraq and Syria. This vast desert was the principal theater of operations.

To the west are the irrigated lands of the Mesopotamian Valley.

In the desert roads are poor and few, following the water holes, many of which are dry in the dry season.

The constantly shifting sand dunes leave this area with few permanent land marks. (A)

Northern India

Flowing mountains overlooking fertile valleys run east and west across Northern India in parallel ridges.

The mountains have had passes cut through them by the rivers in the soft parts of the range, forming avenues of approach for both friend and foe, to reach the valleys and lowlands of central and southern India.

The Himalayas on the north, rising to 18,000 feet, cover an area 200 miles deep and 1,500 miles long. (B)

Libyan Desert

A region in North Africa including parts of Egypt, Tripoli and Barca and lying to the west of the Nile. It is an immense, stony plateau, rising from 600 to 1,000 feet above the Nile in gentle terraces. Westward the desert merges into the unexplored wastes of the Sahara. Devoid of vegetation except for the oases. (C) The theater of operations comprises the largest stretch of totally dry sand desert in Africa. One stretch of 375 miles of trackless desert lies between Gialo and Cufra without a trace of water. This stretch had to be traversed by ground forces in the capture of Cufra. (D)

Morocco

Bounded by the Mediterranean Sea, the Atlantic Ocean and the Sahara Desert.

It comprises all types of terrain from snow-capped mountains to fertile valleys and vast stretches of trackless desert.

This theater provided the most diversified terrain of any considered. Much of the action took place in the deserts. (E)

Nicaragua

The Central American Cordilleras form the backbone of the country, running northwest and southeast at a distance of 12 to 30 miles from the Pacific.

On the west is a longitudinal depression dotted with lakes and volcanic cones. On the east, a broad upland broken by mountain ravines. The Caribbean coast is low and swampy.

The country is generally tropical and vast jungles predominate.

The plateaus in the interior are cool and healthful, while the coast lines are tropical and most unhealthy. (E) page 540

Section 2

ENGLAND

The British, probably more than any other nation, have had an opportunity to make use of their air force since the World War.

Two distinct theaters, each of widely divergent terrain, have been operated in by the R.A.F. -- India and Iraq.

Rebellious Indian tribes formed many expeditions against the British rule in India between 1925 and 1933. Principal of these are: Waziristan 1925, Mohmand Territory 1927, Waziristan 1928, the 1930 Frontier disturbances, Ultman Khel 1930, Peshwar Incursion 1930 and Kolka 1933.

It is unnecessary to go into detail for each separate action as the methods applied in one case were equally successful in another.

In the beginning the ground forces attempted to put down these uprisings but as soon as the ground army withdrew, action, would again be taken by the warlike tribesmen.

Finally the air force was brought into play. First the invading column would be bombed then notice dropped that the homes of the leaders would be attacked. If the warning was not successful then actual bombing of home villages was undertaken and in no instance did this procedure fail to produce the desired result of breaking up columns and causing a breakdown of the uprising.

It is interesting to note the great difference in casualties between ground and air operations. A few comparisons follow:

Operations	1919			
	Casualties			
	Killed	British Wounded	Enemy Killed	Enemy Wounded
Khyber Pass	22	76	150	360
Dakka	28	114	321	525
Kurran	12	82	unknown	
Chitral	16	48	280	40
Baluchistan	18	40	--	250 --
Zhob	105	123	129	Unknown

Since 1924

Air Operations	Casualties			
	British Killed	British Wounded	Enemy Killed	Enemy Wounded
Wasiristan 1925	2	0	Small	
Mohmand Territory	0	0	30	40
Wasiristan 1928	0	0	Small	
Wasiristan 1930	0	0	7	unknown
Ultman Khel	0	0	29	12

Can anyone deny that, in face of the above statistics, that air control of rebellious tribes is not only speedy but humane and comparatively inexpensive?

Results which would have taken months, coupled with severe casualties on both sides, and cost very large sums of money were accomplished by the air force, alone, in a few days with few casualties and at small cost.

(F) pp 249-273.

In Iraq the same type of action was engaged in over vastly different terrain.

The Southern Desert of Iraq having a border of some 500 miles was a trackless waste of sand traversed only by camel trails following the wells and oases. (A)

Air control began in Iraq in 1922. The campaigns in Iraq (Mesopotamia) extended from 1920 to 1930 and are listed as follows: The 1920 insurrection, North East of Baghdad 1922, Nasiriyah 1923, Mosul Vilayet 1923, Ibn Saud 1923, South of Baghdad 1924, Sheikh Salum 1924, Iraq--Najd borders 1928-1929, Southern Desert 1930, Shaikh Mahmud 1930 and Shaikh Ahmed 1931.

As all of the operations were carried out in the same manner it is necessary to describe only one.

Warlike tribes would make incursions into the desert of Iraq, stealing camels and robbing caravans, and before they could be apprehended would return to their own land and disband. (H) pp. 420, Vol. 76

The following is typical of the method of exercising air control. In October 1930 the outlaw Shaikh Mahmud had collected an armed tribal force on the Persian border and threatened the peace in southern Kurdistan.

The terrain was exceptionally difficult for army operations. Moreover, the tribesmen who knew every inch of the land and were expert in guerilla warfare would have little difficulty in evading the British troops in the rugged, precipitous mountains and the narrow, scrubby valleys abounding in cover. Indeed it was generally recognized that the old type of punitive expedition would never have brought the issue to a successful conclusion, and would have been tremendously costly in lives and suffering to all concerned.

After Shaikh Mahmud had been given ample time to reconsider his folly, action against him began.

At first it was decided to give the Iraq Army the opportunity to become skilled in the art of war and two columns were formed. Although aircraft cooperated bombing was restricted to bodies of men who were holding up columns. The columns, containing no regular troops, soon met with difficulties and reverses. An important Police Post was beleaguered and was about to surrender and the rebelling spread and threatened to become dangerous.

Air control was then adopted and bombing was started after the customary warning to villages giving shelter to the rebels. Small practice bombs were at first dropped to give the tribes a final opportunity of escaping to safety. The effect was immediate and the rebels quickly dispersed and the Sirkals from practically all over the villages concerned obeyed the summons to report themselves. The rebels retired out of the district and authority was restored. Shaikh Mahmud surrendered and this ended the career of one of the most "Stormy Petrels" of Iraq. (F) p. 270

The border, 500 miles long, was patrolled by three flights of aircraft. Raids were made, concentrations located and proposed operations against Iraq abandoned. (G)

Is there any other way, than by the use of aircraft, that such a large territory could be controlled, Is there any way that outlaws could have been subdued with loss of fewer lives or the expenditure of less money? The writer thinks not.

From the operations of the British it may well be concluded that aircraft utilized as a police force in lands of mountain, desert, marsh and swamp, is the most humane, speedy and inexpensive of all methods.

To quote - "How could such speedy action be taken except by air and if action were delayed bandits would return to the desert and be lost." (I)

Section 3
FRENCH IN MOROCCO

In Morocco there was more aviation used than during any other campaign since the World War, and its use there gives an excellent picture of the many uses to which aviation can be put.

In April, May and June of 1925 the French Northern frontier in Morocco from Aoudour to Deben was suddenly disrupted and penetrated by the Riffs. Outposts were encircled and attacked.

Supporting ground troops arrived very slowly due to the nature and expanse of French possessions in North Africa and poor communications.

The aviation was concentrated at once and used as a covering force, to maintain communication and furnish supply as well as prevent hostile artillery bombardment. Direct support was furnished the mobile ground groups.

"It (the aviation) inflicted heavy losses on insurgent bands which were advancing beyond the middle Ouergha, by Fes and Bali or by the Deben toward Fes. These bands dared only continue their advance by night, withdrawing or scattering by day to escape air attack." (A very similar condition arose in Nicaragua as will be seen later.) "It greatly assisted every mobile group. Several of these admitted that aviation saved them from sustaining heavier losses, or else they contributed the success of the day to aviation.

(J) page 20

"It is therefore evident that aviation is a resourceful covering arm. It is undoubtedly the most effective of all on account of its moral effect, because it delays and disperses the enemy at the very moment it sights it and finally because of its great mobility and radius of action it can be massed instantly at the point where the invader must be stopped. (J) page 21

Aviation from the beginning was used in considerable numbers in support of ground forces. In the early stages from 3 to 7 squadrons supported a mobile group marching to attack. These squadrons would perform from 130 to 170 battle missions in one day.

Later on, as the ground forces came in more direct contact, four squadrons were used to support a division which was part of an army and as high as seven squadrons supported an independent division in an attack.

It was realized from the beginning that maximum results would be gained from the use of aviation against rear areas, but due to the shortage of aviation and the desperate situation of the ground troops, aviation in the early months was used in direct support and only after several months did it attempt action in rear areas which was highly successful.

There was concentrated by the French the following:

1 Squadron Farman-Jupiter (bombardment)

21 Squadrons Breguet (observation).

The latter type was made an all purpose plane used for light bombardment, attack and observation.

All types of missions which are performed by aviation were performed by the French. Attack, observation, bombardment, infantry contact. In addition artillery officers were taken up for observation and liaison.

There was a great shortage of both artillery and artillery ammunition with the French forces which greatly retarded ground operations, and for that reason aviation was pressed into service to supply that deficiency.

As the Riffs often greatly outnumbered the French and generally were in good defensive positions, the shortage of artillery became acute. There follows an account of the varied use of air force as an aid to and supplement for artillery.

In May 1925 at Medrouma, an artillery preparation was much needed but the artillery was lacking. It was decided to use bombardment to lay down a preparation fire similar to that laid down by artillery. It was so successful that it was done again in July 1926 at Tizi n Tazoult and in September 1925 at Bibabe. (J) pages 43-44

Between 1925 and 1926 aviation was used to:

- a. Put down preparation
- b. Harass and interdict
- c. For accompanying fire
- d. Defensive fire
- e. Counterbattery
- f. Counterpreparation - all with great success.

In June 1925 the Group Defrere, having met a force greatly superior, was forced to withdraw. Defrere began to fall back on the Ouessan River. His flanks were exposed and his condition became critical. Aviation was sent to his aid and acting as attack delivered withering fire on the heads of the pursuing columns and the flanking forces, thus permitting Defrere to execute a successful withdrawal. (J) page 56

Due to the difficulty of using wheel transportation, the supply situation and problem of evacuation became quite serious. Soon aviation was pressed into service to relieve this condition. Transport planes would bring in supplies and evacuate the more seriously wounded. It soon became a routine matter for a squadron to come up, assist in an attack and then land by its own forces, pick up the wounded and fly them to the rear.

Considering the amount of aviation used and the type missions flown it is remarkable how small the casualty list was. It is true that here as well as in Iraq, India, Nicaragua there was no hostile air force but there were machine guns and rifles in great numbers.

There were 67 pilots, 34 of whom served for two years and 33 who served less than that time who were never injured. The casualties suffered by the French were as follows:

Killed	By accident	16
	By the enemy	3
Wounded	By accident	23
	By enemy	4

The Riff Campaign would have been prolonged for many months had there been no aviation and the losses in men, materiel and money would have been much more.

Section 4
ITALIANS IN LIBYA

The operations in the Libyan Desert by the Italians will be treated in two phases, viz.: the operations in Fezzan and Cyrenaica.

Fifty airplanes were available based at Hon, Sirte and Tripoli. Ground troops were organized in three columns with objectives Edri-Ubasi, Solati and Brach.

During the last months of 1929 an irregular force--the Garian levy, was sent toward Solati. Contact was made on September 3 and very soon this force was surrounded and forced to defend themselves in Bed el Aiat. Air intervention was necessary. There was no intermediate landing field. The air force had to fly 50 kilometers over mountains and 200 kilometers over arid desert to reach the expedition. The airplanes surprised the enemy, bombed them for four days and forced them to raise the siege.

Prior to the occupation of Fezzan a composite flight was formed. They picked routes over an unmapped area for the motor columns. Planes would even land near the columns to give them detailed information. They took part in the occupation of Brach by bombing strong concentrations.

Mohamed ben Hag Hassen formed a large force near Hassi Suisse. The terrain here is a succession of "ramlehs" or sand hills forming successive barriers over a distance of hundreds of kilometers. Maneuver by ground forces was difficult and hazardous. On February 13 four airplanes surprised the rebels and kept on them until on February 15 the rebels, having retreated to the French border surrendered to the French rather than suffer final defeat by the Italians.

Operations in Cyrenaica.

In this campaign, as in the Fezzan, the air force was used to lead columns across the desert, maintaining liaison and joining in combat when resistance was met.

Wireless communication worked satisfactorily and observation planes would locate a concentration, immediately radio the air base at Slonta and bombardment planes would come out and attack. While many planes were hit by rifle fire, none were brought down and no casualties occurred.

The following report is interesting as it shows the effect of aviation on rebel bands and parallels the results reported in Morocco as we have seen, and in Nicaragua as we shall see later.

"The rebels realized the impossibility of forming large units, as they learned by costly experience that the vigilant observation of the reconnaissance planes was immediately followed by bombing and machine gun fire from the air and by the arrival of troops. They therefore decided to act in small detachments scattered over the whole of the Gebel and to limit their activity to ambushes and acts of common banditry. The lack of the air force thus became much more difficult, because it was much less easy to observe these small detachments. Reconnaissance had therefore to be carried out at lower altitudes in order to detect even the smallest peculiarities in the area under observation." (K) pages 377-378

An ambush was laid by rebels at Garet Hauuari in January 1931. Air reconnaissance did not show anything unusual. A ground reconnaissance showed numerous traces of recent movements. Air reconnaissance was again requested. The tracks were picked up and followed to an oasis on the line of march of the ground troops. The commander was informed and while he deployed his forces for battle, the air force bombed the oasis and the engagement which was planned as an ambush lasted only one and one-half hours. The air force inflicted great loss on retreating columns by machine gun fire until darkness interrupted the pursuit.

The final clean up came in January 1931. Ground and air forces cooperating, finally broke up all organized resistance. (K) pages 374-380

The Italians completed eight years of military operations in Libya in 1932.

"During these past years of practically continuous military activities the air force in Libya have taken a leading part in the campaign for the suppression and pacification of the rebellious Arab tribes by the Fascist Government. In fact, the primary elements effecting the conquest and control of that region have been the Air Force, the Camel Corps and armored cars. Marshal Badoglio, the Governor of Libya, has declared that aviation was the one weapon which gave the Italians a definite superiority over the rebels in spite of the latter's greatest numbers, and enabled Italian forces to drive their military operations to a successful campaign." (L)

Section 5

NICARAGUA

In studying the use of aviation in Nicaragua there is no better authority than the official report of Major Ross Rowell, USMC commander of the Aircraft Squadrons, 2nd Brigade U.S. Marines, hence the writer will quote him at length. This report covers the period July 1, 1927 to June 20, 1928 and is typical of all air operations during the Nicaraguan Campaign.

The air elements of the 2nd Brigade had a threefold mission, viz: Observation aviation, attack of ground troops and air transport service.

The author of the report treated the subject under the headings - (1) Infantry Liaison, (2) Visual reconnaissance, (3) Photography, (4) Air Transport, (5) Combat.

The nature of warfare in Nicaragua being essentially guerilla, resulted in dispersion of the ground units into a series of patrol operations by small columns operating far into rough, heavily forested mountains and remote jungles. Under the above conditions troop commanders depended almost entirely upon air liaison to control, maintain contact with and receive reports from the patrols, also to furnish them with medical and other emergency supplies and furnish them with the only combat support possible. Communication was by panels and pick up message and report made daily to commanders in the field as to location, condition and needs of the patrols. (M) page 3

Visual reconnaissance. - The usual mission assigned was to determine the strength, movement and location of the outlaws under Sandino. Early in the action these outlaws were in camps, and made no effort to conceal themselves nor their identity and would fire on the planes. Later on, every effort was made to conceal themselves and deceive the observer even to the extent of concealing their arms and mingling with innocent civilians. The outlaws confined their operations to terrain which afforded the best cover and never fired on aircraft unless they were discovered and attacked.

When the above situation became apparent it was necessary for pilots to adopt bolder tactics, flying at low altitudes and approaching camps from behind hills or woods with engines throttled and at times planes flew around houses so low that observers could see in the windows and occasionally send in a burst of machine gun fire.

Observers soon became proficient enough that despite all ruses and attempts at concealment, they were able to submit positive information that was later verified by patrols.

Photography was limited due to clouds, lack of equipment, etc., but many obliques were taken and mosaics made of all localities which were especially important for troop commanders.

Due to the nature of the terrain it was difficult to keep up with supply and personnel replacement. Four Fokker transports were put into service and supplies and personnel flown. An entire regimental headquarters was transported to the front and in the first six months of 1928 a total of 900,000 pounds of supplies and 1,500 men were transported by air.

Combat. - As there were no accepted tactics for use of aviation against ground forces, the commander fitted his tactics to the situations, some times attacking with planes in column and some times in V formation. Troops were attacked on the trails, in bivouac and stronghold. Some attacks were made in conjunction with ground troops and some independent operations were carried out.

Three incidents stand out and are worthy of note. A small Marine garrison was besieged in the town of Ocatol by 600 outlaws. It was only a matter of time until this garrison would be destroyed. This situation was discovered by an air patrol. An organized attack by five planes using machine guns and fragmentation bombs was made. "This action lasted only 45 minutes but met with the greatest success. Not only were the outlaws driven from the field with severe casualties and the siege immediately raised, but their forces were shattered and their morale destroyed. They never returned to the vicinity of Ocatol."

On another occasion Sandino entrenched a position on a large, distant mountain known as Chipoto. This force was about 1,000 men. There were insufficient troops available to assault the position. Four airplanes, unsupported by any other force, attacked the position. They encountered heavy rifle and machine gun fire. The stronghold was immediately abandoned. Results which it would have taken months and with great loss of material and men by ground troops was accomplished in a day by four airplanes without loss of life to the attackers.

Another incident stands out as being unique in the annals of aviation. Captain Livingston's column had been ambushed at Quilali. They had suffered severe losses and both senior officers seriously wounded. A message picked up requested air escort for the column as the commander was certain that he would meet further ambush. A continuous air escort was furnished. Three separate ambushes were discovered and dispersed by air and the column extricated from a delicate situation without a shot being fired at it. Before the column moved a Marine Lieutenant landed ten times under almost impossible conditions, bringing in a relief commander and evacuating 18 men who were seriously wounded. (M) pages 1-25

The success of the Marines in Nicaragua was due to a large degree upon the efforts of the air squadrons. Contact between columns in the jungle would have been almost impossible without air liaison. Strongholds in the interior, such as Chipoto, would have held out for months against ground attack. Ambushes would have taken the lives of many men and the bandit Sandino would have held out much longer.

It seems appropriate here to quote a very pertinent observation.

"A thorough knowledge of the strategy and tactics of air fighting assists an air force in attaining air supremacy. In war complete air supremacy is victory. A nation possessing complete air supremacy has put out the eyes of his opponent; it is fighting a blind man, for air supremacy reaches further than the prosecution and prevention of observation, it also maims the opponent and stifles his will to fight." (N) pages 181-183

CONCLUSIONS

I. That a nation without an adequate air force can not wage a successful war against any nation possessing such a force.

II. That an inferior ground force supported by aviation can defeat a force much stronger which has no aviation.

III. That the air force unassisted can reduce isolated strongholds.

IV. That the nations having colonial possessions where rebellious tribes resort to guerilla warfare, find in aviation the speediest, most economical and humane method of controlling these tribes.

V. There is no substitute for aviation in guerilla warfare.

BIBLIOGRAPHY

- A -- Encyclopaedia Britannica - Vol. 12, page 590. [Class No.: 032]
- B -- Nelson's Encyclopaedia - Vol. VI, page 395. [Class No.: 031]
- C -- Nelson's Encyclopaedia - Vol. VII, page 302. [Class No.: 031]
- D -- Intelligence Summary, War Department - July-December 1932,
page 13877 [Class No.: M 204-0.73-B5-B6]
- E -- Nelson's Encyclopaedia - Vol. VIII, page 289. [Class No. 031]
- F -- Royal Air Force Quarterly - July 1934, pp. 249-273.
[Class No.: M 409-0.42-B6]
- G -- Royal Air Force Quarterly - January 1934, pp. 10-13.
[Class No.: M 409-0.42-B6]
- H -- Journal of the Royal United Service Institution - Vol. 76.
[Class No.: M 104-0.42-B6]
- I -- Royal Air Force Quarterly - July 1933, page 246.
[Class No.: M 409-0.42-B6]
- J -- "Some lessons in aviation matters from the Moroccan campaign."
By General Armengaud. A translation by Major W.O. Butler.
- K -- Journal of the Royal United Service Institution - Vol. 78.
[Class No.: M 104-0.42-B6]
- L -- Intelligence Summary, War Department - July-December 1932,
page 13876 [Class No.: M 204-0.73-B5-B6]
- M -- Official report of Major (now Colonel) Ross Rowell, USMC.
- N -- "The strategy and tactics of air fighting." - By Major Oliver
Stewart, MC, AFC. [Class No.: M 409-J1-A.42]